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10/681,308	10/09/2003	Jin Li	M4065.0965/P965	7977

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EXAMINER	
HARRINGTON, ALICIA M	

ART UNIT	PAPER NUMBER
2873	

DATE MAILED: 05/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/681,308	LI ET AL.	
	Examiner	Art Unit	
	Alicia M. Harrington	2873	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 February 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9,11-27,30-45 and 56-62* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9,11-27,30-42,44,45, and 56-62* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1, 17,18,24,36,39, and 42 (Tokumitsu (US 5,238,856)) have been considered but are moot in view of the new ground(s) of rejection.

2. Applicant's arguments filed 2/10/06 have been fully considered but they are not persuasive in respect to Foster (US 6,643,386). Applicant argues (see page 19 of the arguments) that Foster fails to teach the amended claim features wherein a number of said plurality of first micro-lenses is greater than a number of said plurality of second micro lenses and wherein said first and second set are regularly distributed throughout said micro lens array in accordance with a predetermined color pattern for image capture. The Examiner must respectfully disagree. Figure 3 illustrates a color filter array (CFA; 32,34,36) with micro lens 38 of the same size. This array/image can have altered CFA or altered lenses or both (see col. 4,lines 9-20). Figure 6 illustrates a micro lens array with varying size. The CFA underlying the lenses can have a conventional pattern (col. 6,lines 1-17), such as the Bayer array (see col. 3, lines 47-62). The Bayer array has a greater number of green color filters than red and blue. Therefore, Foster teaches an array where the first set of micro lenses having a first size and corresponding to a first color (green); and a second micro lenses having a second size and corresponding second color (red or blue), the first set abuts the second set and the number of first lenses is greater than the second (the number of lenses corresponding to the green is greater in number corresponding to the blue or red); and wherein the first and second

set are regularly distributed in accordance with a predetermined color pattern- a Bayer pattern with a image watermark area) for image capture (see abstract or col. 2,lines 40-46). Thus, Foster teachers the claimed limitations.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-3,6-7,11-18,20,21,24,30,31,33-39,44,45,56-62 are rejected under 35 U.S.C. 102(b) as being anticipated by Foster (US 6,643,386).

Regarding claims 1 and 57, Foster discloses a micro-lens array, comprising:

a first set of micro-lenses comprising a plurality of first micro-lenses (see figure 6 for example #38; or #52 of figure 6 or #38 of see figure 3) each having a first size; and

a second set of micro-lenses comprising a plurality of second micro-lenses each having a second size (#38 or #52 of figure 6 or #38 of figure 3);

wherein at least one of said plurality of first micro-lenses at least abuts at least one of said plurality of second micro-lenses (see col. 4, lines 9-45 and col. 6).

In summary, Figure 3 illustrates a color filter array (CFA; 32,34,36) with micro lens 38 of the same size. This array/image can have altered CFA or altered lenses or both (see col. 4,lines 9-20). Figure 6 illustrates a micro-lenses array with varying size.

The CFA underlying the lenses can have a conventional pattern (col. 6,lines 1-17), such as the Bayer array (see col. 3, lines 47-62). The Bayer array has a greater number of green color filters than red and blue. Therefore, Foster teaches an array where the first set of micro lenses having a first size and corresponding to a first color (green); and a second micro lenses having a second size and corresponding second color (red or blue), the first set abuts the second set and number of first lenses is greater than the second (the number of lenses corresponding to the green color is greater in number corresponding to the blue or red); and wherein the first and second set are regularly distributed in accordance with a predetermined color pattern- a Bayer pattern with a image watermark area) for image capture (see abstract or col. 2,lines 40-46).

Regarding claim 2, Foster discloses a third size and color (a third lens –for example blue; #54).

Regarding claim 3, Foster discloses equal sizes in figure 3.

Regarding claims 6 and 58, Foster discloses a first set (for example 38 of figure 6 or 3); second set (for example 52 of figure 6 or 38 of figure 3) and third set (for example 54 of figure 6 or 38 of figure 3); wherein the first lenses abut without overlapping the second and third set-see figure 6 and col. 6.

In summary, Figure 3 illustrates a color filter array (CFA; 32,34,36) with micro lens 38 of the same size. This array/image can have altered CFA or altered lenses or both (see col. 4,lines 9-20). Figure 6 illustrates a microlenses array with varying size. The CFA underlying the lenses can have a conventional pattern (col. 6,lines 1-17), such as the Bayer array (see col. 3, lines 47-62). The Bayer array has a greater number of green

color filters than red and blue. Therefore, Foster teaches an array where the first set of micro lenses having a first size and corresponding to a first color (green); and a second micro lenses having a second size and corresponding second color (red or blue), the first set abuts the second set and number of first lenses is greater than the second (the number of lenses corresponding to the green color greater in number corresponding to the blue or red); and wherein the first and second set are regularly distributed in accordance with a predetermined color pattern- a Bayer pattern with a image watermark area) for image capture (see abstract or col. 2,lines 40-46).

Regarding claim 7, Foster discloses the micro-lens array of claim 6, wherein said first micro-lenses have a first size (38) and said second micro-lenses have a second size (52), said second size being no smaller than said first size (38)- in the embodiment of figure 6.

Regarding claim 11, see the embodiment of figure 3 in Foster.

Regarding claims 12-13 and 59, see figure 3 or Foster discloses an embodiment of figure 5 comprising a first set (48) and second set (46) and third set (38) where the first set exhibit different optical transmission properties than said second set and the first and second abut without overlapping(R, B, G-color filter arrangement).

In summary, Figure 3 illustrates a color filter array (CFA; 32,34,36) with micro lens 38 of the same size. This array/image can have altered CFA or altered lenses or both (see col. 4,lines 9-20). Figure 6 illustrates a micro-lens array with varying size. The CFA underlying the lenses can have a conventional pattern (col. 6,lines 1-17), such as the Bayer array (see col. 3, lines 47-62). The Bayer array has a greater number of

green color filters than red and blue. Therefore, Foster teaches an array where the first set of micro lenses having a first size and corresponding to a first color (green); and a second micro lenses having a second size and corresponding second color (red or blue), the first abuts the second set and number of first lenses is greater than the second (the number of lenses corresponding to the green is greater the number corresponding to the blue or red); and wherein the first and second set are regularly distributed in accordance with a predetermined color pattern- a Bayer pattern with a image watermark area) for image capture (see abstract or col. 2,lines 40-46).

Regarding claims 14-15, Foster discloses the third set exhibits different optical transmission properties than the first and second-see col. 5, lines 49-65 (additive primary-RGB or subtractive secondary).

Regarding claim 16, Foster discloses the first micro lens abuts the second and third micro lenses-see figure 5 or 6.

Regarding claims 17,24, and 61, Foster discloses pixel array (see col. 4,lines 10-19) with photo sensor and micro lenses comprising a first set (38 of figure 3 or see figure 6 for example); a second set (52 of figure 6; or 38 of figure 3); wherein the micro lens array is substantially space-less (abuts) between the micro lenses.

In summary, Figure 3 illustrates a color filter array (CFA; 32,34,36) with micro-lens 38 of the same size. This array/image can have altered CFA or altered lenses or both (see col. 4,lines 9-20). Figure 6 illustrates a micro-lenses array with varying size. The CFA underlying the lenses can have a conventional pattern (col. 6,lines 1-17), such as the Bayer array (see col. 3, lines 47-62). The Bayer array has a greater number of

green color filters than red and blue. Therefore, Foster teaches an array where the first set of micro lenses having a first size and corresponding to a first color (green); and a second micro lenses having a second size and corresponding second color (red or blue), the first set abuts the second set and number of first lenses is greater than the second (the number of lenses corresponding to the green is greater the number corresponding to the blue or red); and wherein the first and second set are regularly distributed in accordance with a predetermined color pattern- a Bayer pattern with a image watermark area) for image capture (see abstract or col. 2,lines 40-46).

Regarding claim 18, Foster discloses the first size is different from the second size (see figure 6).

Regarding claim 20-21 and 33,35 and 56, Foster discloses a third size (54); wherein the micro lens array is substantially space-less between (abuts) the micro lenses. For example a Bayer pattern (RGB).

Regarding claims 30 and 31, see element 30 of figure 6 of Foster.

Regarding claim 34, see the embodiment of figure 3.

Regarding claim 36-39,44 and 62, the first (38) micro lens, second micro lens (52), and third micro lens (54) with color filter (30) and substrate (28) of figure 6 or the embodiment of figure 3 where first, second and third micro lenses are the same size.

In summary, Figure 3 illustrates a color filter array (CFA; 32,34,36) with micro lens 38 of the same size. This array/image can have altered CFA or altered lenses or both (see col. 4,lines 9-20). Figure 6 illustrates a micro-lenses array with varying size. The CFA underlying the lenses can have a conventional pattern (col. 6,lines 1-17), such as the

Bayer array (see col. 3, lines 47-62). The Bayer array has a greater number of green color filters than red and blue. Therefore, Foster teaches an array where the first set of micro lenses having a first size and corresponding to a first color (green); and a second micro lenses having a second size and corresponding second color (red or blue), the first abuts the second set and number of first lenses is greater than the second (the number of lenses corresponding to the green is greater in number corresponding to the blue or red); and wherein the first and second set are regularly distributed in accordance with a predetermined color pattern- a Bayer pattern with a image watermark area) for image capture (see abstract or col. 2,lines 40-46).

Regarding claim 45, see the embodiment of figure 3.

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1,17,24,and 36 are rejected under 35 U.S.C. 102(e) as being anticipated by Tsuboi (US 2003/0063210).

Regarding claim 1,17,24 and 36, Tsuboi discloses a micro lenses array comprising a first set micro lenses (Green), second set of micro lenses (Red or Blue), where the first and second abuts without overlapping (see figure 1;section 13), the first set number is greater than a second set micro lenses (green-Bayer pattern) and both sets are regularly distributed.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 8,9,22,23,25-27,40-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Foster (US 6,643,386) in view of Li (US 2002/0176037).

Regarding claim 8,22,25,26,40-41, Foster fails to specifically disclose the focal lengths of the lenses are approximately the same.

In the same field of endeavor, Li teaches the lens curvature, thickness, material and resulting focal length are well known art optical calculations done to provide proper focus of the micro lens at the sensor (see sections 25-26). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made that focal lengths of the first and second are approximately equal because the pixel sites of the

first, second lens and third lenses are in the same substrate and it to assures each lens focuses light onto the pixel sight and not in the layers-loss light.

Regarding claim 9,23,27,42 Foster discloses the sizes of the lens are varied and the color filters adjacent the lens can be a variety of colors-see col. 6. However, Foster fails to specifically disclose the focal lengths are adjusted according to the color signal.

In the same field of endeavor, Li teaches the lens curvature, thickness, material and resulting focal length are well known art optical calculations done to provide proper focus of the micro lens at the sensor (see sections 25-26). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the focal length according the color/wavelength of light, since the wavelength would affect how deeply the light at the different wavelengths would enter the photo-sensor region and for the specific purpose of providing a good color response one would want the lights stopping at the photo sensor only, not other regions of the substrate.

9. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Foster (US 6,643,386) in view of Omori Hiroki (JP 200-260968).

Regarding claim 19, Foster discloses the micro lenses and/or filters may be primary colors (RGB). However, Foster fails to specifically discloses the first lens (smaller) corresponds to the green pixel cell and second micro lenses (larger) corresponds to a red and/or blue pixel cell.

In the same field of endeavor, Hiroki discloses a color image sensor where the sizes of the micro lenses for red and blue are larger than the micro lenses for the green pixel cells (see solution section). Thus, it would have been obvious to one of ordinary

skill in the art at the time the invention was made to modify Foster, as taught by Hiroki, for the specific purpose of reducing noise in the low sensitivity colors.

10. Claims 24-27,30-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hokari (US 5;493,143) in view of Tsuboi (US 2003/0063210).

Regarding claim 24, Hokari discloses a semiconductor-based imager, comprising:

a substrate (1) having pixel cells formed thereon (see col. 3, lines 40-50), each with a see (2);

a micro-lens array (9), comprising:

a first plurality of first micro-lenses each having a first size (for example 9G); and

a second plurality of second micro-lenses each having a second size (for example 9R-height or 9B-surface area; see col. 6, lines 40-61) larger than said first size (9G-see figures 8-11);

wherein said second micro-lenses (for example 9B) are adapted to collect a greater amount of light than said first micro-lenses (9G- the Blue lens is larger surface area-see for example figure 11). Hokari fails to specifically disclose the semiconductor-based imager of claim 24, wherein at least one of said second micro-lenses abuts at least one of said first micro-lenses.

Tsuboi teaches that prior lenses have spaces between the lenses. Tsuboi improves on the prior art imagers by placing lenses to abut and where there is still open space, Tsuboi inserts small reflectors to close all gaps between the lenses (see section 13, 32-40). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to abut at least one of a first and second micro lenses,

to improved detection efficiency. It would have been further obvious to provide a color filter pattern such that the first micro-lenses is greater in number than a second plurality of micro-lenses (such as a Bayer color pattern), since the Bayer arrangement is well known and the human eye is most sensitive to the Green color in which the green color is sampled at twice the rate of blue and red to provide a good color image.

Regarding claim 25, Hokari discloses the semiconductor-based imager of claim 24, wherein said first (9G) and said second (for example 9B) micro-lenses each exhibit a similar focal length (In one embodiment, the micro lens material is wavelength selective and the light for individual wavelengths are focused at the photo sensor- see figures 9, 10e and 11- col. 5,lines and 15-20 and 50-55).

Regarding claim 26, Hokari discloses the semiconductor-based imager of claim 25, wherein said focal length extends to said photo sensors (see figure 9 and col. 5, lines 15-20).

Regarding claim 27, Hokari discloses the semiconductor-based imager of claim 24, wherein a focal length of the plurality of first micro-lenses is adjusted for a first color signal, and wherein a focal length of the plurality of second micro-lenses is adjusted for a second color signal (In the embodiment of figure 8, each lens had a different curvature and thickness-see col. 5, lines 25-50).

Regarding claim 30, Hokari discloses the semiconductor-based imager of claim 24, further comprising a color filter array (20G, 20R, 20B) positioned over said pixel cells (see figure 9; col. 5,lines 55-65).

Regarding claim 31, Hokari discloses the semiconductor-based imager of claim 30, wherein said color filter (20G, 20R, 20B) array is positioned between said micro-lens array (9) and said wafer (1).

Regarding claim 32, Hokari discloses the semiconductor-based imager of claim 24, further comprising a light shield (7) positioned between said micro-lens array (9) and said wafer (1).

Regarding claim 33, Hokari discloses the semiconductor-based imager of claim 24, wherein said micro-lens array further comprises a third plurality of third micro-lenses each having a third size (for example 12 R).

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alicia M. Harrington whose telephone number is 571 272 2330. The examiner can normally be reached on Monday - Thursday 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ricky Mack can be reached on 571 272 2333. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Alicia M Harrington
Examiner
Art Unit 2873

AMH

RICKY MACK
SUPERVISORY PATENT EXAMINER